ARMY SBIR PHASE II QUALITY AWARDS 2003

FUTURE COMBAT SYSTEMS

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The Army is undertaking a transformation into a more responsive, deployable, and sustainable force, while maintaining high levels of lethality, survivability, and versatility. In unveiling this new strategy, GEN Eric Shinseki, then Chief of Staff of the Army, stated, "Heavy forces must be more strategically deployable and more agile with a smaller logistical footprint, and light forces must be more lethal, survivable, and tactically mobile."

This new force is called the **Objective Force (OF)**, and is intended to meet the full spectrum of present and future Army missions. The cornerstone of the OF capability and the transformation is the **Future Combat Systems (FCS)** Program. This reconfigurable, adaptive ***system of systems*** will provide a common baseline capability that increases the Army's ability to conduct network/collaboration centric warfare. The Army is working to develop and demonstrate the first generation of FCS, and all its enabling technologies, within this decade. This transformation has had, and will continue to have, a major impact on the entire Army Science and Technology (S&T) enterprise — to include the SBIR Program. During 2000, the SBIR Program was aligned with FCS and OF technology categories — this will be an ongoing process as OF/FCS needs change and evolve.

Real-time Sensors

Surface Optics Corporation, San Diego, California

Hyperspectral imaging is a growing field with enormous military and commercial potential. Because of the immense amount of data collected by hyperspectral imaging systems, and in order to exploit the data in real-time, fast application specific processing chips are required. Surface Optics Corporation has developed such chips and incorporated them into state-of-the-art, real-time imaging systems that allow the user to view and exploit data. These systems outperform any existing technology currently available in the world. This chip technology is an integral component of a new sensor system for Future Combat Systems and is also being incorporated into sniper detection, target acquisition, and mine detection systems. It is being commercialized to benefit plant health by identifying fungus, insect, and disease damage and to identify biological and chemical compounds, and also in the field of medical imaging.

U.S. Army Armaments Research, Development and Engineering Center

Continuous Power Anywhere

HI-Z Technology, Incorporated, San Diego, California

Recent events in the Middle East and the Balkans reinforce the belief that the U.S. Army will continue to be called upon to operate in very remote areas throughout the world. Lightweight and self-contained power sources have become critical to successful mission accomplishment in austere environments. HI-Z Technology has successfully developed a lightweight (one pound) thermoelectric power source which, with two pounds of fuel, can produce two watts of power daily for 22 days and has a service life of 18 years. Although present-day thermoelectric modules have relatively low efficiencies at converting the heat of diesel fuel to electricity, the energy density of the fuel is high enough that these generators can achieve values of watt-hours per kilogram that match batteries.

U.S. Army Armaments Research, Development and Engineering Center

Automated Measurement System for High Precision Optics

QED Technologies, Rochester, New York

The Army's requirements under Future Combat Systems are driving direct-view optical and electro-optical sensor systems toward higher performance, physical simplicity, and lower weight. However, fabrication of advanced optics is often seriously hampered by the lack of accurate, affordable metrology. QED's Subaperture Stitching Interferometer (SSI) provides a breakthrough technology, enabling the automatic capture of precise metrology data for large and/or strongly curved surfaces. The SSI is a 6-axis, computer-controlled, interferometric workstation that overcomes the limitations of conventional interferometry. It provides automated, high precision metrology for advanced optics with the following features: automated, user-friendly, deterministic, and repeatable; automatic calibration for system errors; accuracy estimates for its final results; ability to test larger aspheric departure; improved resolution; and potentially increased accuracy.
U.S. Army Armaments Research, Development & Engineering Center

Transparent Ceramics

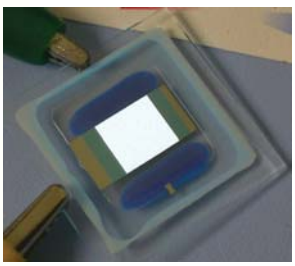
Technology Assessment and Transfer Inc., Annapolis, Maryland

There is a growing need for electro-optic materials that are transparent over a wide range of frequencies, are resistant to sand and rain erosion, and can be fabricated and optically finished at a significantly reduced cost. Developing transparent ceramics for use in armor and electromagnetic windows is an extremely demanding enterprise because the ceramic has to be pore free with excellent chemical purity and homogeneity. Technology Assessment & Transfer is producing magnesium aluminate spinel ($MgA_{l2}O_4$) for dome and window applications in future targeting, surveillance and reconnaissance systems, working with Northrop Grumman and Lockheed Martin. In parallel this spinel has shown exceptional ballistic performance and will provide improved, affordable transparent protection on the battlefield for future soldiers.
U.S. Army Research Laboratory

Communications Intercept & Speech Translation for Security

Technology Engineering Research, Inc., Freehold, New Jersey

The Defense Department and the newly formed Department of Homeland Security are very interested in using communication intercepts to gather intelligence on enemy deployment, movement, and intent; and terrorist activities targeted against the United States. Information of interest can be gleaned from the processing and interpretation of intercepted communications with sensitivity to speaker identification, speech patterns, and semantics. However, these characteristics are buried in the total spectrum, representing a very low Signal-to-Noise-Ratio equivalent, making extraction extremely difficult. TERI successfully developed novel audio processing techniques for the extraction and recognition of specific communication channels from the total audio spectrum based on archived terrorist feature content characteristics. The ability to design and implement wide-band signal recovery methods to improve natural language speech recognition intelligibility and speaker identity, specifically for intercepted speech communications, is a significant milestone for intelligence processing.
U.S. Army Communications-Electronics Command



Micro-displays for Situational Awareness

Universal Display Corporation, Ewing, New Jersey

The U.S. Army requires lightweight, compact, and low power consumption color displays to give future soldiers expanded situational awareness. A key component of these systems is a backlight to illuminate a miniature liquid crystal display. Universal Display Corporation, together with its University partners at Princeton and the University of Southern California, developed and demonstrated novel extremely thin, highly efficient white phosphorescent organic light emitting device (PHOLED™) backlights, in addition to stacked transparent OLED (TOLED™) backlights to provide time-sequential color images from higher aperture monochrome displays. This technology is also applicable to transparent, flexible, and conformable display programs.
U.S. Army Communications-Electronics Command

Army SBIR Phase II Quality Awards

The Army SBIR Program sponsors an annual Quality Awards Program that recognizes exceptional Army SBIR Phase II projects. Each year, a distinguished panel of Army and industry experts selects the winning projects from nominations submitted across the Army.

During the 02.2 Solicitation, the Army received over 3000 Phase I proposals, of which 350 were chosen for Phase I award. During the same fiscal year, the Army invited and received over 340 Phase II proposals, of which 180 were selected for award.

This year, as in the past, the competition was keen. The Army received 32 Quality Award nominations and selected six winning projects. These six projects represent the best in technology innovation, relevance to the needs of the Army, and commercialization potential.

In recognition of their accomplishments, the winners and their projects are showcased at several Army conferences and symposia throughout the year via this Army SBIR Phase II Quality Awards brochure.

2003 Winners

Real-time Sensors: Surface Optics Corporation

Continuous Power Anywhere: HI-Z Technology, Incorporated

Automated Measurement System for High Precision Optics: QED Technologies

Transparent Ceramics: Technology Assessment and Transfer Inc.

Communications Intercept & Speech Translation for Security: Technology Engineering Research, Inc.

Micro-displays for Situational Awareness: Universal Display Corporation

The SBIR Program

Congress initiated the SBIR Program in 1982 to increase small business participation in federal research and development. Successful Army SBIR research efforts move through three phases:

- Phase I: Feasibility Study, which lasts up to six months and is funded for up to $70,000 with a $50,000 option available.
- Phase II: Research and Development, which lasts up to two years for up to $730,000.
- Phase III: Commercialization, which requires funding from the private sector or non-SBIR program sources.

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